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The last section of the paper is devoted to the consideration of the mechanical effects of muscular contraction; and experiments are stated with a view to compare the *effective work* of a muscular contraction, as determined empirically with the work calculated according to the principles of the dynamical theory of heat.

Employing the dynamometer already described in the fourth series of his researches, the author has found that the mechanical work effected by a single contraction of the gastrocnemius muscle of a frog may be expressed by 0.00001457 kilogramme-metres. Determining next the quantity of zinc required to be oxidated in the pile in order to excite a single contraction, he finds that the force developed by the muscle is enormously greater than could be accounted for on the supposition that it is produced by the conversion into muscular energy of the equivalent of electricity corresponding to the quantity of zinc oxidated. He accordingly concludes, that the electric current which *excites* a muscle to action does not represent the force exerted by the muscle, which is more probably to be referred to the chemical changes, such as oxidation, which take place in the muscular tissue during contraction. The consideration of this branch of the inquiry will form the subject of the second part of the Memoir.

XII. "On the Existence of Multiple Proportion in the quantities of Heat produced by the Chemical Combination of Oxygen and other bodies." By THOMAS WOODS, M.D. Communicated by Professor STOKES, Sec. R.S. Received June 7, 1856.

(Abstract.)

This paper is, in substance, the same as a former paper, bearing a similar title, read before the Royal Society on the 10th January 1856, but contains a more detailed account of the mode of performing the experiments. A repetition of the experiments mentioned in the former paper has led to very nearly the same numerical results, except in the case of molybdenum, which is found to give 4.8 thermal units by combining with oxygen, instead of 3.38, the number formerly given.